

### **Remarks**

Claims 29 to 53 are pending. Claims 37 and 43-53 have been withdrawn from consideration. Claims 5, 29, 33, and 38 have been amended. Claim 54 has been added.

The Examiner courteously granted an interview which was held on August 5, 2003. The claim amendments and the substantive portions of the Office Action were discussed. The remarks which follow reflect the discussion in the interview and are intended to fulfill the requirement for a written statement under MPEP 713.04.

### **Restriction Requirement**

The restriction requirement is traversed. As to the restriction between claim Groups I and III, these groups are not mutually exclusive. Claim Group I is directed to layered sheet constructions comprising a gas permeable water impermeable layer and a gas delivery layer having walls forming flow channels; whereas, Group III is directed to a layered sheet construction comprising a gas permeable water impermeable layer, a gas delivery layer, and at least one microbial support layer. If a microbial support layer were placed over layer a of claim 29, one would have a species of claim 44. The layered sheet constructions of both claim Groups I and III function as biofilm supports in wastewater treatment, as described in the specification. Since Groups I and III are both layered sheet constructions useful in water treatment, and since they are not entirely mutually exclusive, it is urged that they should be examined together.

The restriction between claim Groups I and II should also withdrawn, at least as to claims 37 and 43. The process of claim 37 cannot be practiced with a materially different product (layered sheet construction) since claim 37 depends from claim 29 (in claim Group I). The same holds true for claim 43, which depends from claim 38 (which is in claim Group I). Since these claimed processes depend on the use of layered sheet constructions taken directly from claim Group I, the claim groups should not be divided from each other. During the interview, it was agreed that the process claims could be rejoined when product claims are found allowable.

The inventions of all three claim groups are so closely related in the field of wastewater treatment that a proper search of any of the claim groups would require a search of the others. Reconsideration and withdrawal of the restriction requirement are requested.

Nevertheless, in order to comply with 37 CFR 1.143, the provisional election of claim Group I is confirmed.

**102 Rejections**

Claims 29,30 and 36 stand rejected under 35 USC § 102(b) as being anticipated by McKeown U.S. Patent 4,416,993. This rejection is traversed.

Attached to this Amendment is a table comparing certain elements in the claims in the present application with the disclosures of the references cited against the claims. The undersigned attorney has studied the references, and if a listed element of the present claims was found in a reference, it was noted in the table. A blank space in the table corresponding to a claim element indicates that no disclosure of that claim element was found in the reference. The table is a convenient summary of the differences between the pending claims and the references. The abbreviated descriptions of the claim elements are for purposes of convenient presentation in the table and do not change the actual claim language or scope.

Although McKeown teaches baffles 42 in one version of his apparatus: the baffles do not form a plurality of flow channels, as required in the rejected claims; nor are the baffles located on a side of a gas delivery layer, as required by the rejected claims. Baffles 42 in McKeown protrude from one end or the other of his plate 40. They are not located on a side of a gas delivery layer. McKeown's baffles form a single flow path as shown by McKeown Fig. 9 and as discussed during the interview. On the other hand, the inventive gas delivery layer has a plurality of flow paths formed by walls arising from one side of the layer. Therefore, claims 29, 30 and 36 are novel over McKeown.

Claims 29, 30 32, 35 and 36 have been rejected under 35 USC 102(e) over Cote U.S. 6,558,549. This rejection is traversed.

Cote is missing the requirement (in the rejected claims) for a gas delivery layer comprising a base having a side on which a plurality of walls form a plurality of flow channels through which gas can be conveyed to the gas permeable, water impermeable layer. As noted in the interview, Cote's spacer layer 14 (through which gas is delivered to his membrane) is an expandable mesh (col. 6, ll. 30-32). Although Cote discloses a membrane having spacer layer 214 on two sides, he is missing the feature in rejected claim 32 of a gas delivery layer with a plurality of walls forming flow channels on both sides. Therefore, Cote does not anticipate claims 29, 30, 32, 35 and 36.

New claim 54 adds to the features of claim 29 at least one microbial support layer on the side of the gas permeable, water impermeable layer opposite the gas delivery layer. Since a

microbial support layer is not found in any of the references cited by the Examiner, this new claim is more distinct over the art than claim 29 and is also patentable.

### **103 Rejections**

Claim 34 stands rejected under 35 USC § 103(a) as being unpatentable over either McKeown or Cote in view of Rinker U.S. 4,333,779. This rejection is traversed.

Although Rinker teaches the concept of using corrugated plastic sheets in wastewater treatment, the Examiner has not established a *prima facie* case of obviousness of claim 34 for the following reasons: 1. Rinker does not teach using corrugation for porous membranes (i.e., gas permeable, water impermeable). He only mentions plastic materials listed at columns 2-3 as sheets, and nowhere discloses porous membranes. 2. The combination of Rinker with either McKeown or Cote still has the deficiencies mentioned above with regard to those two references, i.e., no disclosure of a gas delivery layer comprising a base having a side on which a plurality of walls forms a plurality of flow channels. Because of these significant differences between the combined references and claim 34 and the lack of any explanation for why it would be obvious for one of ordinary skill to ignore them, the rejection of claim 34 under 35 USC § 103(a) has been overcome and should be withdrawn.

Claims 31 and 38-42 have been rejected under 35 USC 103(a) as obvious over McKeown in view of EP 526,823. This rejection is traversed.

Although EP 526,823 teaches the use of porous fluoropolymer articles coated with fluoropolymers and other polymers for use in gas diffusion in aqueous liquids, the Examiner has not established a *prima facie* case of obviousness. In order to arrive at claim 31 or 42, one would have to modify the art combination by changing McKeown's baffled plate 40 to the presently claimed gas delivery layer having a plurality of walls on one side which form flow channels for gas. There is nothing in the art itself that would lead one to make such a modification.

Claims 31 and 38-42 have been rejected under 35 USC 103(a) as obvious over Cote in view of EP 526,823. The rejection is traversed.

Although Cote discloses spacer 14, his spacer is an expandable mesh material, not a layer having a side on which a plurality of walls form a plurality of flow channels for gas, as required by claims 31 and 42. Nothing in the combination of EP 526,823 and Cote would lead one to change Cote's spacer to the inventive gas delivery layer.

The modifications required to the cited art in order to overcome the differences cited above, and shown on the claim comparison table, are too great to be obvious to one of ordinary skill. Hindsight with the knowledge of the present invention would be required in order to make such modifications.

The non-obviousness of the present claims is further supported by the benefits which they bring to the field of water treatment:

- The layered sheets having a gas delivery layer with walls can be punctured in one location without disabling a whole water treatment apparatus. Since there are a plurality of gas flow channels in the inventive design, only a small part of the membrane is flooded as a result of a single puncture, see specification page 4 and page 12, line 31 – page 13, line 11.
- For those embodiments having a microbial support layer, a support layer reduces sloughing off of the microbial layer, see specification page 17, lines 20-32, and Example 7.

Neither of the above advantages is possessed by or described in any of the cited prior art references.

**Allowable Subject Matter**

The objection to claim 33 stated at Office Action page 7 has been avoided by the amendment to claim 33 placing it in independent form. It should, therefore, now be allowable.

In view of the above discussion, it is respectfully urged that claims 29-55, as amended, are in condition for allowance. Withdrawal of the rejections under 35 USC 102 and 103 is requested, and a notification of allowability is respectfully solicited. If any questions or issues remain, the resolution of which the Examiner feels would be advanced by a conference with Applicants' attorney, she is invited to contact such attorney at the telephone number noted below.

Respectfully submitted,

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Date

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USSN 10/017,632	McKeown 4,416,993	Cote 6,558,549	Rinker 4,333,779	EP 526 823
Claim 29 gas delivery layer b. comprises base having side on which plurality of walls				
form plurality of flow channels through which gas can be conveyed to layer of part a.				
Claim 31 Gas permeable water impermeable layer of part a. is micro- porous layer coated with gas permeable, polymeric coating.				p. 2 & Claim 1 (oleophobicity not mentioned)
Claim 32 gas delivery layer has 2 sides		Col. 9, ll. 19- 22, Fig. 7		
with plurality of walls forming flow channels through which gas can be conveyed, & having gas permeable, water impermeable layers on both sides of & proximate to gas delivery layer				
Claim 38 Gas permeable water impermeable layer is oleophobic & has i) fluorochemical or fluoropolymer coating; ii) surface treated by ionizing radiation or plasma discharge in presence of fluorinated species; iii) fluoro- chemical additive; or iv) polydimethylsiloxane ctg.				p.2 & Claim 1 (oleophobicity not mentioned)
Cl. 42 Gas delivery layer comprises base having plurality of walls forming flow channels				
Cl. 54 Microbial support layer on layer of part a				
Cl. 55 like claim 38 but without fluorochemical or fluoropolymer coating				